

2540 of Feb-2-14

British

Ewart S. Jr.

Jane

High

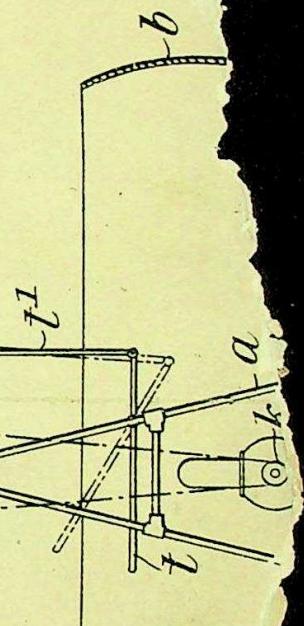
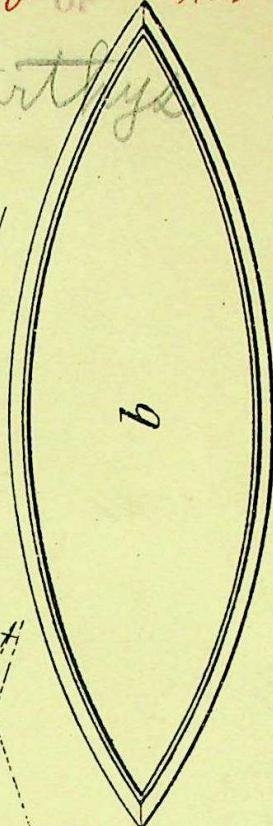
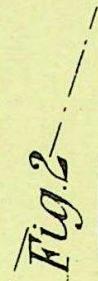
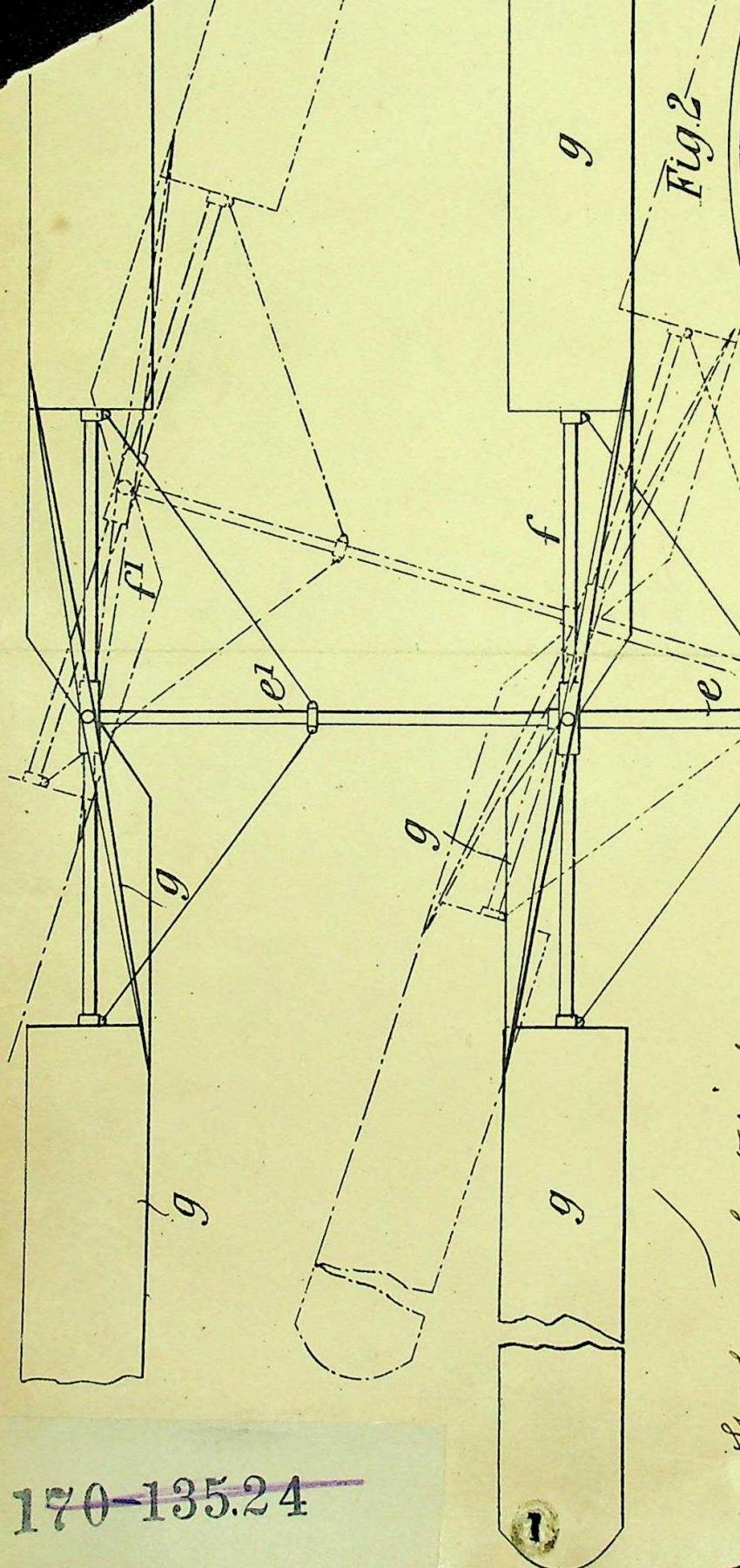
105

19

Donnelly  
1014 643

1014 643 6

King L.



speed may be varied independently by diff gear + brake

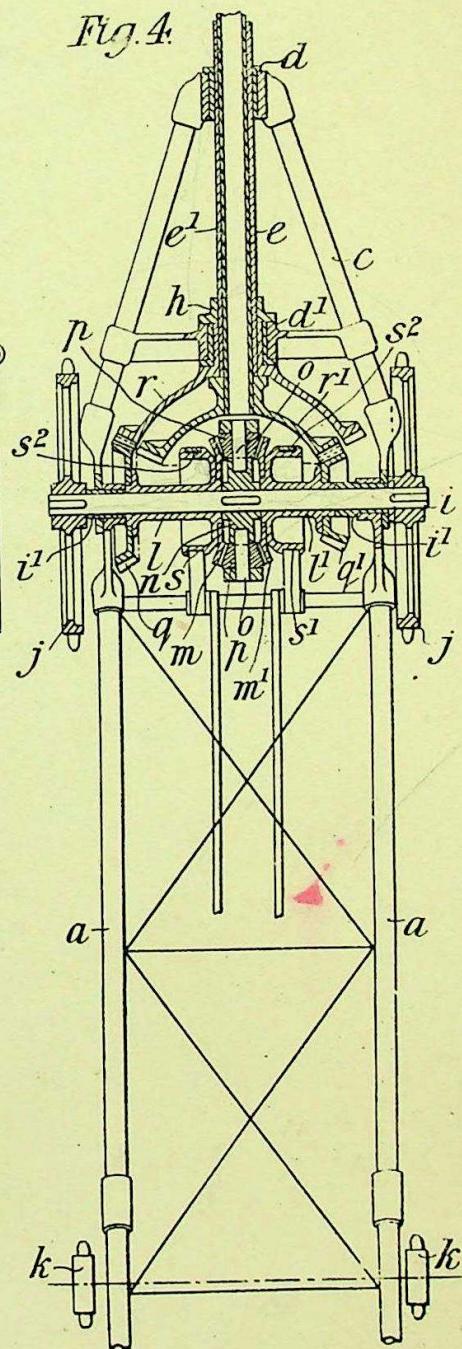
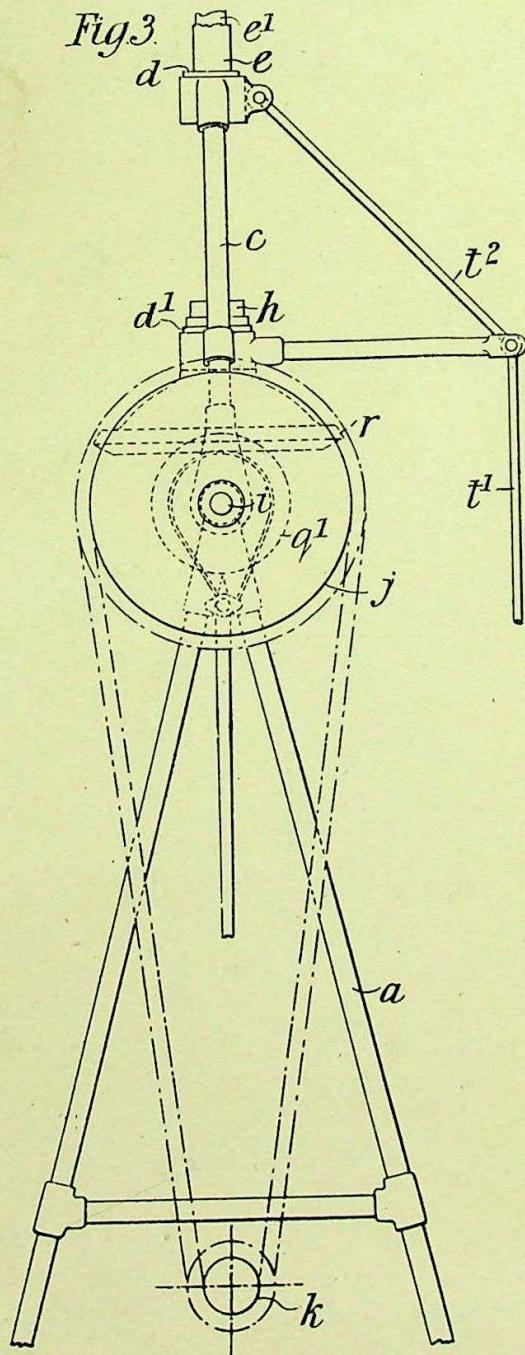
~~170-135.24~~

244-19 BRITISH 2540 OF Feb 2, 1909.

A.D. 1909 FEB 2. N<sup>o</sup> 2540.  
ELWORTHY'S COMPLETE SPECIFICATION.

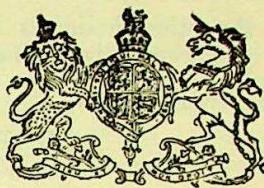
(2 SHEETS,  
SHEET 2.

[This Drawing is an'production of the Original on a reduced scale.]



Bruise is very sharp

N° 2540



A.D. 1909

Duplicate.

*Date of Application, 2nd Feb., 1909**Complete Specification Left, 6th July, 1909—Accepted, 2nd Feb., 1910*

## PROVISIONAL SPECIFICATION.

## "Improvements in Aerial Machines."

I, ROBERT PEARCE ELWORTHY, of Westhorpe, Hendon, in the County of Middlesex, Engineer, do hereby declare the nature of this invention to be as follows:—

My invention relates to aerial machines wherein the motive power instead of being applied indirectly to the aeroplanes, by forcing them through the air at a suitable angle of inclination, is applied directly to the planes themselves.

According to my invention, the aeroplanes constitute the wings of two large propellers which for convenience I term helidiscs, the said helidiscs being superimposed and adapted to revolve on the same axis but in opposite directions. These helidiscs serve not only for supporting the weight of the apparatus and its load, but also for effecting the propulsion of the same, the angle of the helidiscs relatively with the framing carrying the car being altered to permit of this.

In carrying out the invention I propose to employ a light framing attached at the lower end to a platform or car, upon which the motor or motors is or are mounted, and the upper part of which has pivotally mounted upon it an extension frame which carries the bearings for the concentric shafts carrying the helidiscs. The pivot for this extension frame is preferably formed by the shaft, (hereinafter termed the intermediate shaft) through which the motion is transmitted to the concentric shafts, pinions upon the intermediate shaft engaging with crown wheels, arranged one within the other on the adjacent ends of the concentric shafts. The driving pinions are on opposite sides of the axis of the concentric shafts (and may form part of compensating gear) so that the rotation of the intermediate shaft in one direction will serve to drive the concentric shafts in opposite directions. The power of the motor may be transmitted to the intermediate shaft through the medium of sprocket wheels and a chain or chains or by any other suitable mechanism. By arranging the helidiscs to rotate in opposite directions, the tendency which the car and framing would have to rotate if a single helidisc only were used, is counteracted.

The forward movement of the apparatus is effected by altering the angle of the extension frame, and of the shafts which it carries relatively with the main frame, and this can be effected by attaching a wire, rod, or the like to an arm or bracket on the extension frame, the said wire, rod or the like extending into the car, where it can be suitably secured.

Brakes are provided in connection with the compensating gear upon the concentric and intermediate shafts to allow of checking the motion of either shaft to any desired extent, to facilitate steering.

The employment of two helidiscs as hereinbefore described has the further advantage that, should an accident occur to either helidisc, the damaged helidisc, or what remains of it, could be stopped with the brake, the apparatus

[Price 8d.]

*Elworthy's Improvements in Aerial Machines.*

being gradually lowered by the other helidiscs instead of falling rapidly to the ground, as would be the case were only a single helidisc employed.

Dated the 2nd day of February, 1909.

G. F. REDFERN & Co.,  
4, South Street, Finsbury, E.C., and 5  
21, Southampton Buildings, W.C.,  
Agents for the Applicant.

## COMPLETE SPECIFICATION.

## "Improvements in Aerial Machines."

I, ROBERT PEARCE ELWORTHY, of Westhorpe, Hendon, in the County of Middlesex, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to aerial machines of the type wherein superposed propellers adapted to be driven in opposite directions and carried by a pivotally mounted frame designed to be inclined to any suitable angle are employed.

According to my invention, I transmit the driving power to the propellers which for convenience I term helidiscs, through the medium of epicyclic gearing and I arrange brakes in connection with this gearing to allow of driving the propellers at any desired relative speeds from a single motor.

To enable my invention to be fully understood, I will describe the same by reference to the accompanying drawings, in which:—

Figure 1 is an elevation of an aerial machine constructed according to my invention, and shewing the car in section.

Figure 2 is a plan view of the car or body of the machine.

Figure 3 is a side view drawn to a larger scale than Figure 1 of the framing, and

Figure 4 is a sectional view of the same at right angles to Figure 3.

*a* indicates a light framing attached at the lower end to a platform *b*, or car, and the upper part of which has pivotally mounted upon it an extension frame *c* which carries bearings *d*, *d*<sup>1</sup> for two concentric shafts *e*, *e*<sup>1</sup> which rotate one within the other, and which carry respectively the helidiscs *f*, *f*<sup>1</sup>. These are in the form of screw propellers having broad blades *g*, *g*<sup>1</sup> of slow pitch, as shewn in Figure 1. The outer shaft *e* is, as shewn, provided with a collar *h* which supports the weight of the said shaft when at rest upon the bearing *d*<sup>1</sup>.

The spindle or shaft *i* serving as an intermediate shaft for transmitting motion to the helidiscs is mounted in two bushes *i*<sup>1</sup>, *i*<sup>2</sup>, which latter also serve for pivotally connecting the extension frame *c* to the main frame *a*. This intermediate shaft *i* carries at one or both extremities a sprocket wheel *j*, *j*<sup>1</sup>, to which motion is communicated by chains from the sprocket pinion *k*, *k*<sup>1</sup> on the shaft of the motor or motors. At about the middle of its length this intermediate shaft has secured upon it a drum *n* with openings and pins *o*, *o*<sup>1</sup> carrying bevel pinions *p*, *p*<sup>1</sup> engaging with bevel wheels *m*, *m*<sup>1</sup>; these bevel wheels and pinions together forming the well-known epicyclic compensating gear. The bevel wheels *m*, *m*<sup>1</sup> are mounted on loose sleeves at the outer ends of which are mounted other bevel wheels *q*, *q*<sup>1</sup> which respectively engage with the bevel wheels *r*, *r*<sup>1</sup> on the shafts *e*, *e*<sup>1</sup> of the helidiscs, so that when rotary motion is imparted to the intermediate shaft *i*, motion will also be transmitted to the shafts *e*, *e*<sup>1</sup>, and as the pinions *q*, *q*<sup>1</sup> are on opposite sides of the axis of

*Elworthy's Improvements in Aerial Machines.*

the said concentric shafts it will follow that motion will be imparted to the shaft *e* in one direction, and to the shaft *e*<sup>1</sup> in the opposite direction, while the epicyclic gear before mentioned secures equal turning moment to the shafts of the two helidiscs, although their respective turning velocities may differ 5 according to varying air resistances; thus securing the car and frame from any tendency to rotate, such as might result from unbalanced reaction of the helidiscs.

In order to provide for rotating the helidiscs at different speeds, or to allow of using either helidisc as desired, the bevel wheels *m*, *m*<sup>1</sup> have arranged in 10 conjunction with them brake drums *s*, *s*<sup>1</sup> around which brake bands *s*<sup>2</sup>, *s*<sup>3</sup> operated in any suitable manner from the platform *b*, are arranged. The forward movement of the apparatus is effected by altering the angle of the extension frame *c* and of the shaft which it carries relatively with the main frame *a*, as shewn by dotted lines, and this can be accomplished by means of a lever *t* 15 pivoted upon the main frame and connected by a rod *t*<sup>1</sup> to an arm or bracket *t*<sup>2</sup> on the extension frame *c*.

The employment of two helidiscs as hereinbefore described has the further advantage that, should an accident occur to either of the helidiscs, the damaged helidisc, or what remains of it, could be stopped with the brake, the apparatus 20 being gradually lowered by the other helidisc instead of falling rapidly to the ground as would be the case were only a single helidisc employed.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

25 In an aerial machine, wherein superposed propellers, which I term helidiscs, are mounted on concentric shafts and arranged in conjunction with gearing whereby they can be rotated in opposite directions, the said shafts being carried in a pivotally mounted frame so as to permit of their angle of inclination relatively to the main framing being varied, the employment of epicyclic 30 compensating gear in combination with brakes which allow of either propeller or helidisc being rotated independently of the other, or of both propellers or helidiscs being rotated at any desired relative speeds from a single motor, substantially as described.

Dated the 6th day of July, 1909.

35 G. F. REDFERN & Co.,  
4, South Street, Finsbury, E.C., and  
21, Southampton Buildings, W.C.,  
Agents for the Applicant.

Reference has been directed in pursuance of Section 7, Sub-section 4, of the 40 Patents and Designs Act, 1907, to Specifications No. 15,613 of 1905, No. 9413<sup>A</sup> of 1907 and No. 1449 of 1908.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1910.

Munro's  
Burke 8/16-11